

III. *Descriptions of the insects infesting the seeds of Ficus Sycomorus and Carica.* By J. O. WESTWOOD, M.A., F.L.S., &c.

[Read February 1st, 1882.]

PLATES II., III., IV. and V.

It is with much pleasure that I forward to the Entomological Society the completion of a memoir on the insects infesting the seeds of *Ficus Sycomorus* and *Carica* in Egypt and the South of Europe, of which the first portion was read before the Society on the 2nd January, 1837, and was published in the second volume of the Transactions of the Society. It is entirely due to the zeal and untiring perseverance of Sir Sidney S. Saunders that I am enabled to make this additional communication to the Society, accompanied by the extensive series of illustrations representing the structural details of some of the most remarkable hymenopterous insects hitherto discovered, of which the sexes of a most anomalous character are now clearly ascertained. This gentleman has placed in my hands not only numbers of specimens, both dead and alive, of the two species of insects described in my memoir on Caprification, but has also made and allowed me unlimited use of a large series of microscopical preparations and dissections of the insects, exhibiting the most remarkable portions of their organisation.

In the Linnean cabinet is contained a number of winged specimens of the females of the species which I described and figured in my former paper under the name of *Blastophaga Sycomori* (Trans. Ent. Soc. Lond. ii., pl. xx., fig. 4). With these were also preserved several small, almost shapeless, apterous insects, respecting which both Mr. Haliday (who assisted me in examining these insects) and myself were unable to arrive at any satisfactory conclusion, regarding them as undeveloped monsters of some kind, and not supposing it possible, from analogy with all other known species of insects in which the females are winged, that these little creatures

could be the wingless males of *Cynips Psenes* or *C. Sycomori*.

The memoir of Sir S. S. Saunders, published in our Transactions for 1878, p. 313, has shown satisfactorily that not only are these little wingless creatures the legitimate males of the *Blastophaga*, but also that the *Sycocrypta* of M. Coquerel (Rev. et Mag. Zool., 2nd ser., vii., 365 and 422, pl. 10, fig. 3) is the male of a species of *Blastophaga*, as well as that the two species of *Apocrypta* of Coquerel (*ibid.*, pl. 20, figs 1 and 2) are the males of my genus *Sycophaga*, of which only the female (*S. crassipes*, Westw., *op. supr.*, pl. xx., fig. 5) was known, and of which the *Chalcis explorator* of Coquerel (pl. 10, fig. 4) is certainly another female.

In my former memoir I pointed out the relationship of these insects with *Agaon paradoxum* of Dalman, and added that the curious little group which I described were "certainly referable to the *Chalcididæ* rather than to the *Proctotrupidæ*," but that, from their fruit-feeding habits and various anomalous portions of their structure, I hesitated to name any particular group of the former family to which they ought to be considered as most nearly allied.

M. Coquerel, in describing several species of fig insects, and unacquainted with my former memoir, regarded them as belonging to the *Heterogyna* of Latreille, but he hesitated between the opinion of Shuckard, who considered my *Typhlopone* as being composed of the females of *Labidus* and *Scleroderma* as wingless females of *Myzine*, and that of myself, who considered *Typhlopone* as neuter *Formicidæ*, and *Scleroderma* as belonging to the *Bethylides*.

M. Coquerel, however, adds:—"Je crois cependant que l'avis de M. Shuckard finira par prévaloir. Je dois me borner, pour aujourd'hui, à faire connaître trois insectes singuliers que j'ai recueillis à l'île Bourbon et que je regarde comme les femelles aveugles et aptères de quelque mâle ailé et inconnu, et qui me paraissent devoir prendre place à côté des *Scleroderma*." Of these little apterous insects M. Coquerel found "une infinité" inside the figs, in which he also found the "petits Chalcidites," which "volaient à l'entour," the former living "pêle-mêle avec les Chalcidites, qui selon toute apparence s'étaient développés à leurs dépens."

The researches of Sir S. S. Saunders have fully proved

that M. Coquerel's supposed wingless females are the wingless males of winged females, and that they certainly are not parasitic on their winged partners. My two memoirs on *Scleroderma*, published in our Transactions (vol. ii. and 1881), and the illustrations of the sexes of *Scleroderma* given in my 'Thesaurus Entomologicus' (Pl. 31), will equally show that whilst *Scleroderma* is referable to the *Bethylides*, the fig-insects have no real relationship therewith.

Discarding then the supposed relationship of these fig-insects with the *Heterogyna* of Latreille, as well as with the Bethylikeous *Sclerodermæ*, we must search for their genuine allies in the other great divisions of the Spiculiferous Terebrantia (see my Introd. Mod. Class., Ins. ii. p. 124), namely, the gall-feeding *Cynipidæ*, with a subspiral ovipositor; or the parasitic *Ichneumonidæ*, with a straight ovipositor and straight multiarticulate antennæ having a short basal joint; or the parasitic *Chalcididæ*, with a straight ovipositor and more or less elbowed few-jointed antennæ, having a long basal joint. The difficulty attending the adoption of a classification in which either structure or economy is implicitly adopted, is well shown in some of these Terebrant groups, whether families or genera. Thus in the vegetable-feeding gall-making *Cynipidæ* we have species which are parasitic on other insects, as is the case with the little species of my genus *Allotria*, of which I observed a female in the act of ovipositing in the body of a rose-aphis, and subsequently reared specimens hatched from infested Aphides. Other parasitic species of *Cynipidæ* are also recorded in my 'Introduction' ii., p. 132.

We thus see that Phytophagism is no bar for the exclusion of parasitism as an exclusive character of the *Cynipidæ*; but the structure of the fig-insects, especially as shown in the females (whose character must be considered as more truly normal than that of the males), recedes so entirely from that of the *Cynipidæ* that we cannot for a moment adopt the suggestion that the fig-insects are *Cynipidæ*; in fact, although phytophagists, they are certainly not gallicolists.

With the parasitic *Ichneumonidæ* and *Chalcididæ* it might be urged that they are more nearly related, notwithstanding their plant-feeding habits; and here again we are led not to place too much weight upon economy, from the fact that some species of *Eurytoma* (next to

which genus Latreille placed Dalman's *Agaoon*) are plant-feeders; this is well ascertained to be the case with *Eurytoma hordei*, *fulripes*, *tritici* and *secalis*, the larvæ of which infest wheat-stalks, and are well known in America under the name of the "joint-worm"; and I have described and figured, in the 'Gardener's Chronicle,' 1869, p. 1230, a species of *Eurytoma* which feeds upon and destroys the bulbs of a Brazilian *Cattleya*. Hence M. Coquerel had no hesitation, in describing the female of one of his fig-insects, to give it the name of *Chalcis* ? *explorator*, and it is impossible to compare his figure of that insect (*op. cit.*, Pl. x., fig. 4), or mine of *Sycophaga crassipes* (Pl. ii., fig. 2), with a female *Callimome* and not be convinced that the fig-species are most closely related to *Callimome* (many of the species of which are parasites on some of the gall-making *Cynipidæ*); the structure of the antennæ (even to the minute articulations following the second joint), the fusion of the three terminal joints of these organs, the structure of the wings and wing-veins, and the long exerted straight ovipositor, sufficiently prove that these insects must be placed in the great family *Chalcididæ*. These characters also seem to me to forbid the union of the fig-insects with the *Ichneumonidæ*, which have long, multiarticulate, straight, equal-jointed, antennæ, more strongly-veined wings, and of which the majority of the species are of a much larger size, together with the absence of metallic colours of the body (which is seen in some of the fig-insects); whilst none of the *Ichneumonidæ*, I believe, are known to be otherwise than parasitic on other insects.

Mr. Walker, in his 'Notes on *Chalcididæ*' (as he terms the *Chalcididæ*), has adopted (without acknowledgment) my opinion of the relation of these insects with *Agaoon*, and has formed them into an uncharacterised family, *Agaoonidæ*. He speaks of them (p. 59) as the "most rudimentary form of the tribe, or the earliest created among them, or the first 'won from the void and formless infinite.'" He adds that Coquerel supposed that they have their place next to *Scleroderma*, which, he affirms, has "no near affinity with the *Bethylidæ*, and which has been supposed by some to belong to the *Mutillidæ*, and by others to be the female of *Myzine*. It has some resemblance to the female Australian and South American *Thynnini*, and by these connections the primitive and semichaotic forms discovered by Dr.

Coquerel expand into the numerous and powerful tribe of Aculeate Hymenoptera, surpassing other insects in intellect, of which the wasp and the bee are the most familiar examples, though a great part control other orders of insects by using them as food for their young"! A relation with *Typhlopone* and *Dichthadia* is then suggested, "and thereby the multitudinous tribe of ants, whose economy is so remarkable, emerges from the blind and radical *Apocryptæ* and *Sycocryptæ*, the perpetual dwellers in the interior of figs. But the affinity of these two genera to the *Chalcidiæ* is more evident, and appears by several connecting links in the *Aganoidæ*; and thus the near relations to the general ancestors of the thousands, and perhaps tens of thousands, of the *Chalcidiæ* species, the tribe being considered in unity, are cradled in figs"! Believers in the doctrine of evolution may well pray to be defended from such friends as the writer of these passages.

Mr. Walker has described several new genera of fig-insects from Hindostan, observed in the fruit of *Ficus indica* by Sir Walter Elliot, one of which is asserted to resemble "some Hymenoptera and *Termes*, or the white ant, in having a working class as well as males and females." This is probably the species which he next describes under the name of *Sycobia bethyloides*, giving separate descriptions of the female and "neuter?, worker?" He gives no description of the male; and as he was ignorant of the connection between the sexes of the already described species of fig-insects, I apprehend that his neuters or workers are in reality wingless males of a distinct group.

Sycophaga crassipes. (Plates II. and III.)

Westw., Trans. Ent. Soc. Lond. ii., p. 222.

Of this species both sexes have been received in considerable numbers from Egypt, infesting the seeds of *Ficus Sycomorus*, by Sir Sidney S. Saunders.

Description of the male.—The males are long, narrow, subdepressed insects having much the appearance of a small pale-coloured species of *Staphylinidæ* without elytra or wings, and with a pair of elongated setose anal appendages. The head is oblong, depressed, with the sides parallel; the anterior margin of the upper side of

the head has a deflexed point, whilst its front margin on the lower side has a deep impression on each side, within which the mandibles are affixed (Plate II., figs. 10, 11; and Plate III., fig. 12). In the second of these figures the buccal opening is seen, looking obliquely into the mouth; near the base of each of the antennæ is a black patch, which cannot be regarded as the rudimental eyes; and there are five dark-coloured longitudinal narrow streaks running along the whole length of the head.

The eyes are entirely wanting in the males, nor have I been able to detect any rudiment of the maxillæ and labium or palpi.

The mandibles, on the contrary, are very powerful, horny, trigonate, with the apex acute and curved, and the inner margin armed with two sharp conical teeth. The antennæ are very short, not one-third of the length of the head, composed apparently of only three joints, the basal one very large, broadly ovate and depressed, the second very small and obconic, and the third ovate-conic, apparently formed of three anchylosed joints, the first indicated by two rather strong but minute bristles, and the third apparently being a sort of very minute terminal nipple (see figs. 10, 12, and 14). The base of the head has a small transverse horny subovate kind of socket, by which it is attached in the cavity of the anterior margin of the prothorax.

The prothorax is nearly equal in size to the head, with the anterior angles rounded off; on the under side it is shortened for the insertion of the basal joint of the fore legs; the meso- and metathorax together are rather larger than the prothorax. The mesothorax is somewhat shield-shaped, truncated at its extremity on the upper side between the coxæ of the middle legs; it has a depression across its centre, an impressed line running from its base to join this impression. The metathorax is shorter, more transverse, with the sides rounded, the posterior angles removed in order to allow the insertion of the posterior coxæ. These segments exhibit no traces of elytra or wings. The legs are all short and very robust; as their structure affords specific distinctions with reference to other species of fig-insects (of which I possess a considerable number from different species of Indian and Ceylonese figs) I have been very careful in giving correct representations of them; the various figures in the plates illustrating this paper having been

made by the camera and reduced to a scale. The fore legs are represented in fig. 19, the middle ones in fig. 20, and the hind ones in fig. 21.

The coxæ in all these legs are very large, flattened, and oval in form, the trochanters very small, the femora large, flattened, and ovate; the tibiæ are about the length of the femora, armed beyond the middle and at the extremity with a number of short strong spines; the tarsi are five-jointed, the four basal joints very short, the fifth longer, subclavate, and the ungues are strong, the base of each on the inner edge being dilated and flattened. A minute pulvillus exists between the ungues, but is concealed by the dilated bases of the latter. The abdomen is elongated, flattened, very movable, the joints having the posterior margin produced on each side into an acute point, allowing much lateral motion in this part of the body. It is composed of seven joints, the first of which is small in consequence of the dilatation of the posterior coxæ. The terminal segment has the middle of its hind margin rounded, slightly produced backwards and entire (figs. 8 and 15), and is armed with two elongated villose cerci destitute of articulations, each terminating in an acute point. The base of each of these cerci is internally in communication with a gigantic trachea, which, in transparently mounted specimens, may be traced backwards as far as the prothorax. The male organs of generation are generally retracted within the extremity of the abdomen, as shown in figs. 1, 8, and 15, in which they are represented as seen in transparently mounted individuals; in figs. 16 and 17 these organs are exerted, and are seen to consist of a very slender tube, which is armed with two very minute genital claspers or oblong flattened appendages, having three or four exceedingly small curved teeth at their extremity; (fig. 18 represents the extremity of one of these claspers with three of its little teeth).

Description of the female.—The female *Sycophaga* is represented in fig. 2, drawn by camera from a living specimen sitting quietly on the under side of the glass cover of the little box in which it was placed. Its various parts are therefore represented in their proper relative proportions, which is desirable to be borne in mind whilst comparing this figure with the original representation of the upper side of the female in Trans. Ent.

Soc. Lond. ii., Pl. xx., fig. 5. The head is semioval, subconvex, having an occipital groove down the centre. The eyes are of moderate size, near the posterior angles of the head. I have not detected the ocelli. The mandibles are small, subtrigonal, the apex curved and acute, and the base dilated externally. The other inferior parts of the mouth are represented in my former plate in vol. ii.

The antennæ are rather longer than the head, and consist of a large basal joint, the second being about half the length of the preceding, and affixed in an elbowed position; the third joint is very minute; the fourth is much smaller either than the second or fifth, which latter, with the five following nearly equal-sized joints are slightly thickened to the last, and the three terminal joints are more closely soldered together (as in the majority of the *Chalcididae*), the terminal joint having several minute bristles just below its apex, which is subconical (figs. 5 and 6). The thorax is oblong-ovate, the prothoracic collar large and somewhat trigonal and subdepressed. The wings extend beyond the extremity of the body; the fore wings with the ordinary deflexed cubitus subclavate, and descending rather obliquely into the disc of the wing (fig. 7). The legs are of moderate length, the anterior (fig. 22) and the posterior (fig. 24) having the femora very much thickened, with the tibiæ very short, terminating in strong curved spines, and armed with elongated calcaria, which are bifid at the tip in the anterior legs. The middle pair of legs (fig. 23) in this sex are longer and much more slender than any of the others, with long tibiæ and tarsi, the former having a long, slender, acute calcar. The tarsi are twice the length of the tibiæ in the fore and hind legs, whilst they are equal in length to them in the middle feet. The abdomen is carinated beneath, not quite so broad as the thorax, and the ovipositor is as long as the thorax and abdomen united.

In figs. 3 and 4 I have represented two incidents in the lives of these insects of considerable interest. Fig. 3 shows the terminal portion of the body of a male, of which the head and thorax have penetrated into one of the fig-seeds in search of the enclosed female; whilst in fig. 4 I have represented the female in the act of escaping from the seed in which it has been reared (the aperture of which has been artificially widened to show the position of the enclosed female, of which the three

filaments of the ovipositor are seen to be curled under the body, and to extend in front of and backwards over the head).

Blastophaga Psenes. (Plates IV. and V.)

Cynips Psenes, Linn., Syst. Nat. i., p. 919.

C. Sycomori, Linn. Mus. (*ex parte*); Westw., Trans. Ent.

Soc. Lond vol. ii., p. 221 (*Blastophaga Sycomori*).

Blastophaga grossorum, Gravenhorst.

Description of the male.—Specimens of the males of this species were preserved with the females in the Linnean Cabinet, agreeing with the specimens reared from Corfu and Montpellier figs by Sir Sidney Saunders, which have afforded me the means of supplying so extensive a series of illustrations of this most anomalous creature. It is about a line long, and of a fulvous colour, so that it is with difficulty observed lying amongst the seeds of the fig of *Ficus Carica*. Fig. 32 shows the general appearance of the insect, with the extremity of its body curved beneath the breast; fig. 33 represents it more magnified, and lying a little on one side; fig. 34 shows the abdomen stretched out horizontally; and fig. 35 the same part, with all the very retractile segments of the male organ extended to their full length, drawn from a living specimen.

The head is small and rounded, with two black lateral nearly rounded eyes; the front margin of the head is truncated, with an angular impression in the centre.

The mandibles are small, but strong and subquadrate, with two acute teeth at the apex (fig. 42). The other parts of the mouth appear to be entirely wanting.

The antennæ are very small (fig. 50), and consist of three joints, of which the first and second are obconic and nearly equal in size, the second having its basal portion on the inside more emarginate; the terminal joint is ovate, with a number of small bristles near the apex. The thorax is rather oblong, convex, with the prothoracic portion or collar very large; the mesothorax narrow and short; the metathorax longer, transverse, with a deep impression on each side (apparently to allow the upward free motion of the posterior coxæ), and with a spiracle distinctly visible behind each lateral impression.

There is not the slightest trace of wings or wing-

covers. The legs are varied in structure; the anterior (fig. 37) are very short, but very robust, with the thighs greatly swollen, the tibiæ very short and subtrigonal, the apical angles produced into curved spines; the fore tarsi are also very short, with two basal joints of minute size closely soldered together, the terminal joint clavate, with the unguis very robust, each armed with a strong tooth on the inside. The middle legs (fig. 38), on the contrary, are long and slender, with the joints of the normal size, the tarsi long and composed of five well-defined joints; the hind legs (fig. 39) have the femora and tibiæ thickened, resembling those of the fore legs, but the tarsi are twice the length of the tibiæ and five-jointed, with strong terminal unguis. The abdomen is convex, rather wider than the thorax, with three large basal joints; the following being gradually narrowed and ordinarily bent beneath the thorax (figs. 34 and 35). In fig. 34, which is drawn from a transparently-mounted individual, the male genital organ is seen to be retracted within the abdomen nearly throughout its entire length. In fig. 36 the extremity of the male organ is detached, the apex of the penetrating portion slightly bifid, and extending beyond the extremity of the preceding tubular portion.

The pair of minute claspers seen in the male of *Sycophaga* were not observed in the male *Blastophaga*.

Description of the female.—Referring to the general description of this sex given in my former paper, various additional details merit attention. The head (fig. 40) is nearly round, with the eyes large and strongly granulated. The mandibles (fig. 46), seen sideways, are affixed as usual, and are opened and closed by the ordinary muscles at the basal angle. The large serrated appendages described as palpi by Gravenhorst are not separately movable, not being articulated at the point of their connection with the base of the mandibles; consequently, when the mandibles close, the appendages (which lie flat on the under side of the head) are projected more obliquely towards the sides of the head, and when the mandibles are opened the appendages are brought nearer together, the serratures on the appendages thus probably acting as files or saws in assisting the insect in escaping through the opening which it has commenced making through the walls of the pericarp of the fig in which it has been reared.

In figs. 40, 45, and 47 the maxillæ (which are represented as detached, and seen in two different positions in figs. 48 and 49), are seen to protect the middle part of the lower mouth organ or labium, which arises from an elongated slender mentum, and is apparently articulated in its middle; the organs extend backwards almost to the base of the head (fig. 40), and are protected by two auxiliary corresponding pieces, which ordinarily stand upright (vertically), but which are seen in the figure lying flat, the one on the left side being partially hidden by the serrated appendage of the mandible on that side of the head; these are also seen in fig. 45 extending as far back as the base of the head. I have never met with any similar pieces in any other insect, and cannot conjecture what may be their analogous structure or use, except as defences of the delicate lower parts of the mouth. Fig. 41 represents the upper side of the head of the female, with the antennæ and mandibles removed, showing the central deflexed point of the clypeus, the ocelli, and the two black hastate spine-like spots near the insertion of the antennæ. Fig. 43 shows part of the front of the head of the female, with the mandibles and antennæ removed, exhibiting the notched sockets on each side for the insertion of the base of the mandibles. Fig. 44 shows the deflexed anterior margin of the clypeus.

The antennæ in this sex (fig. 51) are of moderate length, the basal joint being robust and somewhat conical; the second joint of moderate size, much narrowed at the base; the third joint very small, as is also the fourth, but this latter is furnished with a subulated lobe on its outer edge; the eight remaining joints are distinct, and nearly of equal size and thickness, the three terminal ones not being soldered into a mass, as in many *Chalcididæ*.

The fore wings are of large size, with the cubitus rather obliquely deflexed into the disc of the wing (fig. 52). The legs are unequal in size and form; the fore legs are robust (fig. 54), with a strong femur, very short thickened tibia, and long five-jointed tarsus, with strong curved unguis, and a large pulvillus; the middle legs (fig. 55) are of the ordinary form, the femora slightly thickened in the middle, the tibiæ long and slender, and the tarsus as long as the tibia, with a still larger pulvillus; the hind legs (fig. 56) have the femur short and much dilated

towards its base; the tibia very short, armed at its extremity with a large tridentate calcar, and the tarsus resembling that of the fore leg.

The abdomen is compressed, with the ovipositor extending about one-third of its length beyond the extremity. Its composition is shown in fig. 53, where the parts have been separated by pressure. The basal portions of its component parts are thus seen to be semicircularly curved and dilated; this is especially the case with the two slender lateral sheaths, which are a little dilated and twisted in the middle, the tips being obtuse and finely setose; whilst the central spicula is acute at the tip, with its middle portion resting within the bifid terminal ventral segment of the abdomen.

My figures 25 to 31 illustrate certain interesting points in the economy of this remarkable insect. Fig. 25 represents the fig of *Ficus Carica* from Corfu and Montpellier. Fig. 26 represents the minute, white, fleshy, larva taken from within one of the seeds of this fig. Fig. 27 represents the female pupa taken from the interior of a fig-seed, and fig. 28 the pupa of a male. Fig. 29 represents the female pupa rolled up within the seed; fig. 30 a female escaping from one of the seeds in which she had been reared; and fig. 31 represents a male exerting his generative organ into a fig-seed which contained the female insect.

EXPLANATION OF PLATES.

PLATE II.

- Fig. 1. *Sycophaga crassipes* male, magnified.
 2. " " female, magnified.
 3. Male penetrating a pericarp of the fig.
 4. Female escaping from a pericarp of fig.
 5. Antenna of female.
 6. Second and following joints of ditto.
 7. Part of fore margin of fore wing of female.
 8. Extremity of body of male seen transparently, showing the great tracheæ.
 9. Extremity of anal filaments of male.
 10. Front of head of male from above, with mandibles removed.
 11. Front of head of male from below, with mandibles removed.

PLATE III.

Fig. 12. Front of head of male *Sycophaga*, with antennæ and mandibles *in situ*, seen from below.

13. A mandible and base of antenna of male, from below.
14. Antenna of male, from below.
15. Extremity of abdomen of male, with penis retracted.
- 16 and 17. Ditto, with penis more or less exerted.
18. Three of the curved spines of the male claspers.
19. Fore leg of male.
20. Mesothorax and middle leg of male.
21. Hind leg of male.
22. Fore leg of female.
23. Middle leg of female.
24. Hind leg of female.

PLATE IV.

25. Fig of *Ficus Carica*, natural size.
26. Larva of *Blastophaga grossorum*, Grav., from Montpellier, highly magnified.
27. Pupa of female. From Corfu.
28. Pupa of male of ditto. From Corfu.
29. Pupa of female of ditto within a pericarp of the fig.
30. Female of ditto escaping from a pericarp.
31. Male of ditto introducing the extremity of its generative organs into a pericarp.
32. Male of ditto seen from above.
33. Ditto, more strongly magnified, seen sideways.
34. Abdomen of ditto, with the male organ entirely retracted, drawn from mounted specimen (seen transparently).
35. Abdomen of ditto, with the male organ fully protruded, drawn from living specimen.
36. Extremity of the male organ, detached.
37. Fore leg of male, highly magnified.
38. Middle leg of ditto.
39. Hind leg of ditto.

PLATE V.

40. Head of female *Blastophaga*, seen from beneath, with mandibles and one appendage *in situ*.
41. Ditto, seen from above, with mandibles and antennæ removed.
42. Part of front of head of male and one mandible.
43. Part of front of head of female with the mandibles removed, showing the notched socket on each side for insertion of base of mandibles.

Fig. 44. Deflexed point in front of clypeus.

45. Lower parts of the mouth of female, with the two corneous vertical basal appendages flattened by compression.
46. One of the mandibles and its serrated appendage, seen laterally.
47. Maxilla and labium.
- 48, 49. Maxillæ seen in different positions.
50. Antenna of male.
51. Antenna of female.
52. Part of fore margin of fore wing of female.
53. Abdomen of female compressed to show the structure of the ovipositor.
54. Fore leg of female.
55. Middle leg of female.
56. Hind leg of female.